

WHAT IS CLAIMED IS:

1. An optical network, comprising:
an optical ring operable to communicate optical
5 traffic;
a plurality of nodes coupled to the optical ring,
each node operable to passively add and drop one or more
traffic streams to and from the optical ring, each
traffic stream comprising at least one channel; and
10 the plurality of nodes comprising:
a hub node operable to selectively pass or
terminate a plurality of individual sub-bands of the
optical traffic; and
a plurality of sub-band nodes each operable to
15 terminate a respective sub-band of the optical traffic.
2. The optical network of Claim 1, wherein the
plurality of nodes further comprises a coupler node
operable to drop and continue optical traffic passing
20 through the coupler node.
3. The optical network of Claim 1, wherein the hub
node comprises:
a demultiplexer operable to demultiplex the optical
25 traffic into its constituent sub-bands;
a plurality of switches each operable to pass or
terminate a respective sub-band; and
a multiplexer operable to multiplex each sub-band
passed at the plurality of switches for communication on
30 the optical ring.

4. The optical network of Claim 3, wherein the demultiplexer and the multiplexer comprise array waveguides.

5 5. The optical network of Claim 1, wherein the plurality of sub-band nodes each comprise a sub-band filter operable to block optical traffic in a respective sub-band.

10 6. The optical network of Claim 1, further comprising a combination sub-band node operable to terminate a plurality of sub-bands of the optical traffic.

15 7. The optical network of Claim 6, wherein the combination sub-node comprises a plurality of cascaded sub-band filters each operable to block optical traffic in a respective sub-band.

8. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and

10 the plurality of nodes comprising a combination node, the combination node comprising:

a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element; and

15 a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic.

9. The optical network of Claim 8, wherein the
20 plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

10. The optical network of Claim 8, wherein the hub
25 node transport element comprises

a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;

a plurality of switches each operable to pass or terminate a respective sub-band; and

30 a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.

11. The optical network of Claim 10, wherein the demultiplexer and the multiplexer comprise array waveguides.

12. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and

10 the plurality of nodes comprising a combination node, the combination node comprising:

a sub-band node transport element operable to terminate a respective sub-band of the optical traffic; and

15 a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic.

13. The optical network of Claim 12, wherein the
20 plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

14. The optical network of Claim 12, wherein the
25 hub node transport element comprises

a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;

a plurality of switches each operable to pass or terminate a respective sub-band; and

30 a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.

15. The optical network of Claim 14, wherein the demultiplexer and the multiplexer comprise array waveguides.

16. A method for communicating traffic on an optical network, comprising:

communicating traffic through an optical ring;

passively adding and dropping one or more traffic
5 streams to and from the optical ring at a plurality of nodes coupled to the optical ring, each traffic stream comprising at least one channel;

selectively passing or terminating a plurality of individual sub-bands of the optical traffic at a hub node
10 of the plurality of nodes; and

terminating a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes of the plurality of nodes, each of the plurality of sub-band nodes terminating a respective sub-band.

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17. The method of Claim 16, further comprising dropping and continuing optical traffic passing through a coupler node of the plurality of nodes.

20 18. The method of Claim 16, further comprising:

demultiplexing the optical traffic into its constituent sub-bands at the hub node;

passing or terminating a plurality of sub-bands using a plurality of switches, each of the plurality of
25 switches passing or terminating a respective sub-band; and

multiplexing at the hub node each sub-band passed at the plurality of switches for communication on the optical ring.

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19. The method of Claim 18, wherein:

demultiplexing the optical traffic comprises demultiplexing the optical traffic with an array waveguide; and

5 multiplexing each sub-band passed at the plurality of switches comprises multiplexing each sub-band passed at the plurality of switches with an array waveguide.

20. The method of Claim 16, wherein terminating a plurality of sub-bands of the optical traffic at a plurality of sub-band nodes comprises blocking a
10 plurality of sub-bands of the optical traffic at a plurality of sub-band nodes using a plurality of sub-band filters.

15 21. The method of Claim 16, further comprising terminating a plurality of sub-bands of the optical traffic at a combination sub-band node.

22. The method of Claim 21, wherein terminating a plurality of sub-bands of the optical traffic at a combination sub-band node comprises terminating a
20 plurality of sub-bands of the optical traffic at a combination sub-band node using a plurality of cascaded sub-band filters, each blocking optical traffic in a
25 respective sub-band.

23. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and

the plurality of nodes comprising:

10 a hub node operable to selectively pass or terminate a plurality of individual channels of the optical traffic; and

a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

15 24. The optical network of Claim 23, wherein the plurality of nodes further comprises a coupler node operable to drop and continue optical traffic passing through the coupler node.

20 25. The optical network of Claim 23, wherein the hub node comprises:

a demultiplexer operable to demultiplex the optical traffic into its constituent channels;

25 a plurality of switches each operable to pass or terminate a respective channel; and

a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

30 26. The optical network of Claim 23, wherein the plurality of sub-band nodes each comprise a sub-band

filter operable to block optical traffic in a respective sub-band.

27. The optical network of Claim 23, further
5 comprising a combination sub-band node operable to
terminate a plurality of sub-bands of the optical
traffic.

28. The optical network of Claim 27, wherein the
10 combination sub-node comprises a plurality of cascaded
sub-band filters each operable to block optical traffic
in a respective sub-band.

29. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and

10 the plurality of nodes comprising a combination node, the combination node comprising:

a coupler node transport element operable to drop and continue optical traffic passing through the coupler node transport element; and

15 a hub node transport element cascaded with the coupler node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual channels of the optical traffic.

30 30. The optical network of Claim 29, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

25 31. The optical network of Claim 29, wherein the hub node transport element comprises

a demultiplexer operable to demultiplex the optical traffic into its constituent channels;

a plurality of switches each operable to pass or terminate a respective channel; and

30 a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

32. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node comprising at least one transport element operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel; and

10 the plurality of nodes comprising a combination node, the combination node comprising:

a sub-band node transport element operable to terminate a respective sub-band of the optical traffic; and

15 a hub node transport element cascaded with the sub-band node transport element, the hub node transport element operable to selectively pass or terminate a plurality of individual channels of the optical traffic.

20 33. The optical network of Claim 32, wherein the plurality of nodes further comprise a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic.

25 34. The optical network of Claim 32, wherein the hub node transport element comprises

a demultiplexer operable to demultiplex the optical traffic into its constituent channels;

a plurality of switches each operable to pass or terminate a respective channel; and

30 a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

35. An optical network, comprising:

an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring, each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel;

the plurality of nodes comprising:

10 a plurality of hub nodes operable to selectively pass or terminate a plurality of individual sub-bands of the optical traffic; and

a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic;

15 wherein the plurality of hub nodes form a plurality of photonic domains each operable to communicate different traffic streams in the same sub-bands without interference.

36. The optical network of Claim 35, wherein the plurality of hub nodes comprises two hub nodes that form two photonic domains.

37. The optical network of Claim 35, wherein the plurality of hub nodes comprises three hub nodes that form three photonic domains.

38. The optical network of Claim 35, wherein each hub node comprises:

30 a demultiplexer operable to demultiplex the optical traffic into its constituent sub-bands;

a plurality of switches each operable to pass or terminate a respective sub-band; and

a multiplexer operable to multiplex each sub-band passed at the plurality of switches for communication on the optical ring.

5 39. The optical network of Claim 38, wherein the plurality of switches are reconfigurable to provide optical shared path protection in the event of an error in the network.

10 40. The optical network of Claim 39, wherein the error comprises a fiber cut.

41. An optical network, comprising:
an optical ring operable to communicate optical traffic;

5 a plurality of nodes coupled to the optical ring,
each node operable to passively add and drop one or more traffic streams to and from the optical ring, each traffic stream comprising at least one channel;

the plurality of nodes comprising:

10 a plurality of hub nodes operable to
selectively pass or terminate a plurality of individual channels of the optical traffic; and

a plurality of sub-band nodes each operable to terminate a respective sub-band of the optical traffic;

15 wherein the plurality of hub nodes form a plurality
of photonic domains each operable to communicate different traffic streams in the same channels without interference.

42. The optical network of Claim 41, wherein the
20 plurality of hub nodes comprises two hub nodes that form two photonic domains.

43. The optical network of Claim 41, wherein the
25 plurality of hub nodes comprises three hub nodes that form three photonic domains.

44. The optical network of Claim 41, wherein each hub node comprises:

30 a demultiplexer operable to demultiplex the optical traffic into its constituent channels;

a plurality of switches each operable to pass or terminate a respective channel; and

a multiplexer operable to multiplex each channel passed at the plurality of switches for communication on the optical ring.

5 45. The optical network of Claim 44, wherein the plurality of switches are reconfigurable to provide optical shared path protection in the event of an error in the network.

10 46. The optical network of Claim 45, wherein the error comprises a fiber cut.